DOCUMENT RESUME

ED 432 300 IR 019 670

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TITLE Beginning the Change Process: Teacher Stages of Concern and Levels of Internet Use in Curriculum Design and Delivery in One Middle and High School Setting.
PUB DATE 1999-03-00
NOTE 7p.; In: SITE 99: Society for Information Technology & Teacher Education International Conference (10th, San Antonio, TX, February 28-March 4, 1999); see IR 019 584.
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Attitude Change; *Behavior Change; Computer Attitudes; Computer Uses in Education; *Curriculum Development; Educational Technology; High Schools; Instructional Design; Instructional Innovation; *Internet; Listservs; Middle Schools; Research Design; Rural Areas; *Teacher Attitudes; *Teacher Behavior; Teacher Surveys; Use Studies
IDENTIFIERS *Stages of Concern; Stages of Concern Questionnaire; Technology Integration; Technology Utilization; Texas

ABSTRACT

This progress report delineates processes and procedures in assessing changes in teacher attitudes and behaviors as they utilize the Internet for the first time in curriculum development and delivery. The setting is a north Texas rural district serving 1,320 students. The sample included 66 teachers in the middle school and high school. Quantitative data on the Stages of Concern Questionnaire were elicited electronically at three checkpoints during the semester (January, March, and May). Quantitative data on the Levels of Use were elicited in face-to-face interviews at the same three checkpoints. Concurrently, all teacher participated in a project listserv which provided structure for professional colloquy and qualitative data for analysis. The model provides a framework for the study of change processes relating to various innovation configurations. (Author/MES)

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ED 432 300

Beginning the Change Process: Teacher Stages of Concern and Levels of Internet Use in Curriculum Design and Delivery in one Middle and High School Setting

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Abstract: This progress report delineates processes and procedures in assessing changes in teacher attitudes and behaviors as they utilize Internet for the first time in curriculum development and delivery. The setting is a north Texas rural district serving 1320 students. The sample includes 66 teachers in the middle school and high school. Quantitative data on the Stages of Concern are elicited electronically at three stages in the semester. Quantitative data on the Levels of Use are elicited in face-to-face interviews at the same three stages. Concurrently all teachers participate in a project listserv which provides structure for professional colloquy and qualitative data for analysis. The model provides a framework for the study of change processes relating to various innovation configurations.

Conceptualization of the Problem

Standards

The problem on local, national, and international levels is to use technology as a tool for learning within meaningful contexts to support learning (Kozma & Shank, 1998). National, state, and local standards identify the need to integrate technology into learning processes in our classrooms. In Texas, the standards reflected in the Texas Essential Knowledge and Skills (TEKS) (Texas Education Agency, 1997) include the computer competencies which the learners must demonstrate in the state learning assessment, the Texas Assessment of Academic Skills (TAAS) (TEA, 1997). Thus Texas students are assessed specifically on technology competencies for which teachers and administrators are held accountable.

The State of Texas not only mandates computer competency standards; it also requires districts to submit a three-year technology plan for approval. The Texas Long-Range Plan for Technology 1996-2010 addresses: (1) teaching and learning, (2) educator preparation and development, (3) administration and support service,

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and (4) infrastructure for technology. The state offers sizable Technology Integration in Education (TIE) grants to support district efforts. As schools move from *first generation of using technology* to the *second generation of thinking with technology*, computers are moved from labs into classrooms. Increasingly, Internet becomes available there.

Internet in the Classroom

The most significant change in the classroom today is not just a computer, but also direct access to the Internet. This practice is congruent with the four goals in the national long-range technology plans and the goals supported by Texas TIE grants. Access to the information superhighway stimulates dramatic changes in the classroom just as it has in millions of home and businesses. Such innovation calls for significant professional development for teachers at all grade levels and all content areas.

Teaching

Research suggests classroom teachers are under-prepared or unprepared to utilize existing electronic resources effectively (Brownell, 1997; Buhendra, 1996; Clawson, 1996; Fisher, 1997). Basic technical productivity skills are not enough. With the increase in the amount of information available, both students and teachers need advanced skills in analysis, evaluation, and synthesis as the new technologies are integrated into the learning process. The teacher no longer holds all authority over knowledge. She/he must work in the information age to support the development of self-directed, meaningful learning for all students. Experienced classroom teachers must not only become technically literate but also must reexamine fundamental beliefs about traditional classroom approaches now being questioned due to expanded opportunities (Dede, 1998).

Much teaching has been largely dependent on the structure and resources provided in the teachers' guides that accompany the selected texts. This assumes that the teacher dispenses the knowledge through texts and the resource choices that he or she makes. In the Information Age, many of our traditional resources are outdated. Today all need to know how to access the knowledge, check the validity, organize, evaluate and synthesize. Thus, the teacher's instructor role becomes more that of a guide. This role may utilize Socratic questioning that leads to higher levels of critical thinking. Such roles are congruent with the constructivist philosophy that requires a tremendous amount of adaptation and flexibility on the part of the teacher.

Evaluating Change

Change is complex and cannot be forced from the top. The individual is the primary focus of change (Fullan & Miles, 1992; Little, 1993). As state and districts set new learner expectations, as the teaching environment is enriched by new opportunities, and as appropriate professional development supports professional growth, teachers *do* change. This model addresses the changes in concerns and usage behaviors as they relate to the utilization of the Internet as a tool for learning.

Change is not finite, not an event. It is a *process*. This research focuses on the *change process* as teachers change in their attitudes and usage behaviors as an innovation is attempted. In education, study of change has been well established in the Concerns Based Adoption Model (CBAM) (Hord, Rutherford, Huling-Austin & Hall, 1987). Twenty years of research with teachers, administrators, and professors have substantiated the reliability and validity of the two instruments: *Stages of Concern Questionnaire (SoCQ)* and *Levels of Use (LoU)*. These instruments are utilized in relationship to the Innovation Configuration (IC) which defines the innovation central to the change being studied.

In this study the Innovation Configuration revolves around Internet access in the classroom and its use by teachers to develop and deliver curriculum. The research collects quantitative data electronically on the SoCQ and by individual interview on the LoU. Electronic teacher discourse is examined qualitatively in order to identify patterns of concerns and usage. The *Nudist Qualitative Analysis Software (NQAS)* provides a research tool to analyze these qualitative data.

The Research Problem

As national and state standards establish goals supporting use of technology as tools for thinking, the philosophy of classroom teachers and traditional classroom methods are being questioned. This ongoing research evaluates the changing of teacher concerns and usage behaviors as they use Internet in their classrooms for the first time in the spring semester of 1999. District training is designed to support the changes, and electronic teacher discourse is established and supported by researchers. The Concerns Based Adoption Model (CBAM) provides two tools to collect quantitative data (SoCQ and LoU). Qualitative data drawn from the electronic teacher discourse provides interpretative and contextual data and is analyzed with NQAS.

Research Design

This descriptive study of changing attitudes and behaviors toward an Innovation Configuration (IC) examines the experience over one semester of 66 classroom teachers in middle and high school settings. The research collects quantitative data on the SoCQ and LoU at three checkpoints (January, March, and May). Qualitative data are collected from teacher electronic discourse through participation in a listserv related to the project. The first four Hypotheses use SoCQ data to address changes over time of the whole faculty and by three groupings (grade level, school level and content specialty). The next two Hypotheses use LoU data collected in individual interviews to assess changes in usage behavior over time and possible relationships to home Internet access. Hypothesis 7 assesses a possible relationship between stages of concern (SoCQ) and home Internet access. Hypothesis 8 uses path analysis is used to track the relative influence of components of the innovation configuration during the first year of adoption.

Hypotheses

1. No significant changes in teacher SoCQ attitudes are evidenced from the beginning of the semester, mid-semester and end of the semester.
2. No significant changes in teacher SoCQ attitudes by *school level* are evidenced between the beginning of the semester, mid-semester and end of the semester.
3. No significant changes in teacher SoCQ attitudes by *grade level* are evidenced between the beginning of the semester, mid-semester and end of the semester.
4. No significant changes in teacher SoCQ attitudes by *content area* at middle and high school levels are evidenced between the beginning of the semester, mid-semester and year end.
5. No significant changes in teacher LoU behavior ratings are evidenced between the beginning of the semester, mid-semester and end of the semester.
6. No significant correlation between home Internet availability and LoU behavior ratings is evidenced.
7. No significant correlation between home Internet availability and SoCQ attitudes is evidenced
8. No significant correlations will be attained among path vectors of the predicted models of change dynamics.

Sample

The census sample (n=66) includes all middle and high school classroom teachers in one small rural Texas school district. Little Elm Independent School District (LEISD) enrolls 1350 students, of whom 45% are designated at-risk, and 22% are minority students. Approximately 120 teachers are employed as classroom teachers in the four schools: primary, intermediate, middle, and high schools. All middle school teachers (n=27) and high school teachers (n=39) had Internet available in their classsrooms for the first time in Spring of 1999. LEISD is one of eleven district partners in the Community Collaborative Professional Development Centers (CCPDC) sponsored by Texas Woman's University. These eleven districts include two urban, three suburban, and six rural professional development sites. This CCPDC entity encompasses the entire TWU undergraduate teacher education program and university liaisons work with each district.

Instruments

The *Stages of Concern Questionnaire (SoCQ)* consists of 35 items that use a seven point Likert response form. Analysis of the data results in placing the subject at one of eight levels of concern: (1) Awareness, (2) Informational, (3) Personal, (4) Management, (5) Consequence, (6) Collaboration, and (7) Refocusing (Hall, Wallace, & Gossett, 1973). The measure was developed at the Research and Development Center for Teacher Education, University of Texas at Austin, and has been heavily used in the change literature (Fullan & Stiegelbauer, 1991; Fullan, 1993a; Fullan, 1993b, Hord et al, 1987).

Hall, George, and Rutherford (1979) assessed the reliability of the 35 items on the questionnaire. They used Cronbach's alpha to examine internal reliability. They report alpha coefficients ranging from .64 to .83 on the seven scales. Test-retest correlations taken two weeks later used the Pearson r correlations and ranged from .65 to .86. The lowest correlations in both analyses occurred in the Stage Zero scales.

The validity of the questionnaire was ascertained from intercorrelation matrices, judgments of concern based on interview data, and examination of concerns in relation to the amount of time of involvement with the specific innovations. Hall and George (1980) determined that the correlations on the 195-item questionnaire were higher near the diagonal. This finding supported the theory that each scale was more like the ones immediately surrounding it than those farther way (Hall & George, 1980). Reliability and validity have both been examined in subsequent studies and the original suppositions have been supported.

The *Level of Use (LoU)* data are collected by individual interviews. A detailed manual developed by Loucks et al. (1975) supports the focused interviews used to assess the level of use of innovations. A detailed guide establishes a list of objectives and questions but the interviewer is provided latitude within the framework guide. Approximately 1680 interviews were conducted during the validation period. Interrater reliability was established using the detailed examples in the manual, and it was fairly simple to reach 70% agreement or more.

The *Innovation Configuration (IC)* specifies the dimensions of the innovation so that all subjects are focused on the same concept as they share their concerns or level of use. The configuration is clarified in the first training and repeated in every data collection. In this study the IC is the access to Internet in the classroom and the ways and degree that the teachers use it in development and delivery of curriculum.

Demographic Data such as gender, teaching experience, certifications, and degrees will be used to describe the sample. Grade level and content specialty will be used to address Hypotheses 2, 3, and 4. Home Internet availability will be utilized in Hypotheses 6 and 7.

The *Nudist Qualitative Analysis Software (NQAS)* in not an "instrument" in the classical sense, but it is a contemporary software tool designed to support qualitative analyses and/or content analysis. This important addition to this exploratory study provides vital background for designing a larger research effort.

Data Analysis

The seven developmental stages of the SoCQ are transferred to a seven-digit number for facet analysis. Hypothesis 1 (changes over time), Hypothesis 2 (time by school groups) Hypothesis 3 (time by grade level, and Hypothesis 4 (time by content area) are be addressed in these analyses using three-digit configurations from the profile to assess initial, middle, and advanced concern concentrations. Change in these configurations will be separately assessed through t-tests for adjacent time periods and repeated measures ANOVA across all three time periods. Facet mapping of changes in the overall profile will also be conducted.

The ratings developed from the LoU interviews are converted to ordinal data for testing of Hypothesis 5 (changes over time) using Wilcoxin's matched-pairs signed-ranks test. Hypotheses 6 data (relationship of LoU

behaviors to home computer availability) are examined using Spearman Rho correlation coefficients. Hypotheses 7 data (relationship of SoCQ attitudes to home computer availability) are examined using ETA correlation coefficients.

Hypothesis 8 will be examined by a path analysis used to track the relative influence of components of the innovation configuration during the first year of adoption. Components to be tracked include (1) access and usage of the classroom computer, (2) participation in the LEISD professional development, (3) home Internet availability, (4) school access to and usage of the Internet, involvement in electronic discourse, (5) beginning SoCQ and LoU profiles, and (6) ending SoCQ and LoU profiles. Strength of influence along vectors will be examined through correlation coefficients.

Qualitative studies are increasing in education. Its advocates believe that depth of understanding of human phenomena is founded on these data. The electronic discourse among teachers will be examined over time. Changes in content themes and value connotations of procedural statements will be charted.

Procedures

1. In August and September, Human Subject Review forms were completed and filed at the University Research office. LEISD administrative approval was obtained at this time. The Principal Investigators (PIs) met with administration in the LEISD central office to plan training schedules and clarify procedures. Installation of technology was delayed and thus limited the study to middle and high schools.
2. In October, the PIs placed the SoCQ on a website for electronic collection of data. Since every teacher will have access in his or her classroom, all data on this measure can be collected anonymously and electronically. The data are imported into the *Statistical Package for the Social Sciences (SPSS)* for analysis of quantitative data.
3. In November, the PIs and GRA explored the NQAS software for the analysis of teacher discourse. SoCQ and LoU concepts are used as a foundation for content analysis but possible patterns were left open for discovery.
4. In December, the PIs and GRA prepared for the January inservice and the first collection of SoCQ data. Plans were made for dissemination at the Society for Information Technology in Teacher Education (SITE) international conference in March in San Antonio.
5. In January, during the University break, the PIs and GRA participated in the teacher inservice, held in Little Elm. Interviews for LoU were conducted. The first set of SoCQ data was collected electronically and first analyses in SPSS were completed. The LoU data was entered into SPSS for analysis. The listserv was established and the collection of teacher electronic discourse data began.
6. In March, the midterm SoCQ data were collected electronically and the GRA completed the second set of interviews for the LoU data. The PIs prepared and presented a progress report for CCPDC personnel, and for the SITE 99 conference. The GRA continues analysis of teacher discourse.
7. In May, GRA completes third set of interviews on LoU. The last set of SoCQ data are collected electronically. The GRA completes data analysis available through SPSS. Qualitative analyses continue through June. PIs plan with LEISD officials for fall inservice and data collection.
8. In June, preliminary findings are offered on the WEB through CCPDC and PI web pages to other CCPDC districts, to professional associations and government agencies.
9. In July, The PIs complete qualitative analysis using the NQAS, and prepare the appropriate research report.
10. In August, PIs and GRA prepare for inservice at LEISD to share first-year results and project research extension to primary and intermediate schools, as they are equipped for the Internet.

Significance

This study has practical value for education practitioners. Importantly, it also promises contributions to the change process literature using technological configuration as the innovation The research values are

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bifurcated: (1) an important study of change process with a contemporary technological innovation, and (2) findings from the qualitative study drawn from teacher electronic discourse.

Change facilitators intervene appropriately as levels of concern are revealed to them. Meeting the needs of the professional, like meeting the needs of our students, helps these professionals advance developmentally in their attitudes and behaviors. Both the quantitative and qualitative analyses provide a strong foundation for effective change facilitation to support the professional development process.

The changes in attitudes and behaviors of these LEISD teachers cannot be generalized because it is a census sample, not a random sample from a specified population. However, the changes in attitudes and behaviors of these LEISD teachers are of significant interest to teachers in other small districts. More than one million Texas students are enrolled in such schools in isolated areas. Internet offers these students and their teachers global access to information and colloquy with their peers in near or distant locations. The Texas Woman's University preservice teachers placed in Little Elm ISD gain unique insights into the use of Internet technology and the changes instituted in the use of Internet for curriculum development and delivery.

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